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EXAMINER

SUMMONS, BARBARA

ART UNIT

PAPER NUMBER

2817

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	09/914,263	Applicant(s)	Nishida et al.
Examiner	Baileya Summons	Group Art Unit	2817

— The MAILING DATE of this communication appears on the cover sheet beneath the correspondence address —

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 (three) MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

Responsive to communication(s) filed on _____

This action is FINAL.

Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 1 1; 453 O.G. 213.

Disposition of Claims

Claim(s) 1 - 8 is/are pending in the application.

Of the above claim(s) _____ is/are withdrawn from consideration.

Claim(s) 7 and 8 is/are allowed.

Claim(s) 1, 4 and 5 is/are rejected.

Claim(s) 2, 3 and 6 is/are objected to.

Claim(s) _____ are subject to restriction or election requirement

Application Papers

The proposed drawing correction, filed on _____ is approved disapproved.

The drawing(s) filed on 10/19/01 is/are objected to by the Examiner

The specification is objected to by the Examiner.

The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119 (a)-(d)

Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).

All Some* None of the:

Certified copies of the priority documents have been received.

Certified copies of the priority documents have been received in Application No. _____.

Copies of the certified copies of the priority documents have been received
in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: _____

Attachment(s)

Information Disclosure Statement(s), PTO-1449, Paper No(s). 5 Interview Summary, PTO-413

Notice of Reference(s) Cited, PTO-892 Notice of Informal Patent Application, PTO-152

Notice of Draftsperson's Patent Drawing Review, PTO-948 Other _____

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DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the surface acoustic wave (SAW) "ladder-type filter" recited in claim 4, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

2. It should be noted that sheet 6/6 of the drawings is not a figure and is not required because all of the reference numerals are mentioned in the specification. Applicants may wish to replace current sheet 6/6 with a new sheet having a new Fig. 8 showing a SAW ladder filter.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-
(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section

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122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

4. Claims 1 and 5 are rejected under 35 U.S.C. § 102(b) as being anticipated by the Ikata et al. article “A Design of Antenna Duplexer Using Ladder Type SAW Filters” (cited by Applicants).

Fig. 4(a) of Ikata et al. discloses an antenna duplexer comprising: a transmitter SAW filter Tx; a receiver SAW filter Rx; and a phase shift circuit ($\lambda/4$ stripline, see also the entire abstract) with one port connected to the transmitter SAW filter at the antenna port node, and with the other port connected to the receiver SAW filter; wherein the two SAW filters have different frequency bands (see e.g. pg. 2, left col., lns. 5-6), providing attenuation with each other; and wherein the phase shift circuit shifts the phase of the receiver SAW filter in its transmitter band [see Fig. 3(b)]; and the phase shift circuit has a phase angle and a characteristic impedance such that at a center frequency in the transmitter-band of the receiver SAW filter, a magnitude of a reflection coefficient is to be not less than 0.8 [i.e. 0.85, see pg. 1, right col., lns. 3-4 and Fig. 3(b) shaded area], and the phase angle of the reflection coefficient is to be from 0° to 45° [see the shaded area of Fig. 3(b)]. Regarding claim 5, a $\lambda/4$ stripline phase shift circuit inherently provides a phase shift of 90° and with $\pm 10^\circ$ due to manufacturing tolerances.

5. Claim 1 is rejected under 35 U.S.C. §§ 102(b) and 102(e) as being anticipated by Yuda et al. WO 99/60700 and the English language equivalent U.S. 6,445,261, respectively.

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The following discussion will reference the U.S. Patent document.

Fig. 7 of Yuda et al. discloses an antenna duplexer comprising: a transmitter SAW filter 16; a receiver SAW filter 17; and a phase shift circuit 18 with one port connected to the transmitter SAW filter at the node to antenna 14, and with the other port connected to the receiver SAW filter; wherein the two SAW filters have different frequency bands (see col. 6, lns. 13-19), providing attenuation with each other; and wherein the phase shift circuit shifts the phase of the receiver SAW filter in its transmitter band [see Fig. 4 between markers M₃ and M₄]; and the phase shift circuit has a phase angle and a characteristic impedance such that at a center frequency in the transmitter-band (i.e. midway between markers M₃ and M₄) of the receiver SAW filter, a magnitude of a reflection coefficient filter is to be not less than 0.8 [i.e. 0.9, see col. 6, lns. 26-30], and the phase angle of the reflection coefficient is to be from 0° to 45° (see Fig. 4 in conjunction with Fig. 8 and col. 8, lns. 11-18), requiring a phase shift of more than 90° (Fig. 8).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to

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the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claim 4 is rejected under 35 U.S.C. § 103(a) as being unpatentable over either one of the article to Ikata et al. (cited by Applicants) or Yuda et al. WO 99/60700 in view of the Dai 26 kai EM Symposium article (cited by Applicants and pertinent translation provided by Applicants).

Each of Ikata et al. and Yuda et al. disclose the invention as discussed above.

Additionally, they both disclose using SAW ladder-type filters [see e.g. Ikata et al. Fig. 3(b) and Yuda et al. Fig. 9]. However, Ikata et al. and Yuda et al. do not disclose a resonance frequency of a serial arm resonator being higher than an antiresonance frequency of a parallel arm resonator.

The EM Symposium article discloses that it is well known to provide a SAW ladder filter with the serial arm resonators having a resonance frequency higher than the antiresonance frequency of the parallel arm resonators in order to provide the benefits of a wider passband (see section 4.4.2, Ins. 4-6 of the translation), decreased loss and improved SWR (see section 4.4.2, Ins. 14-17).

Consequently, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the antenna duplexer or either Ikata et al. or Yuda et al. by having modified their SAW ladder filters, if even necessary, such that the resonance frequency of the series arm resonators would have been higher than the antiresonance frequency of the parallel

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arm resonators, because Ikata et al. and Yuda et al. are silent as to the resonance and antiresonance frequencies of their resonators, and because such an obvious modification would have provided the advantageous benefits of a wider passband, decreased loss and improved SWR as explicitly suggested by the EM Symposium article (see section 4.4.2, Ins. 4-6 and 14-17 of the translation provided by Applicants).

Allowable Subject Matter

8. Claims 7 and 8 are allowable over the prior art of record.
9. Claims 2, 3, and 6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
10. The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record does not disclose or fairly suggest an antenna duplexer having each of the specifically recited features and also especially having a phase shift circuit with a “less-than-50 ohm characteristic impedance” (see claim 2) or a characteristic impedance of “ 42 ± 8 ohms excluding 50 ohms” (see claims 3 and 6). It should be noted that the Ikata et al. article (cited by Applicants) appears to teach away from this by teaching that the phase shift circuit should have a characteristic impedance of 1.06 times Z_0 (i.e. the input impedance from the antenna see Fig. 1),

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wherein Z_0 would normally be 50 ohms and 1.06 times Z_0 would be greater than, not less than, 50 ohms.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The article to Kamogawa et al., "High Isolation SAW Antenna Duplexer Modules" discusses optimized phase shifter conditions for SAW duplexers when matching is not at the value of 50 ohms impedance (see the abstract, and Figs. 2 and 3). However, the article does not have a date of publication prior to Applicants' earliest effective filing date.

12. Any inquiry concerning this communication should be directed to Barbara Summons at telephone number (703) 308-4947, FAX no. (703) 308-7724, receptionist's no. (703) 308-0956, Supervisory Examiner Bob Pascal (703) 308-4909.



Barbara Summons
Primary Examiner
Art Unit 2817

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June 25, 2003